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EVALUATE ERTS IMAGERY FOR MAPPING AND DETECTION OF CHANGES OF SNOWCOVER  
ON LAND AND ON GLACIERS

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Type I Progress Report for Period 1 March 1973 - 30 April 1973

E73-10559) EVALUATE ERTS IMAGERY FOR  
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Prepared for:

Goddard Space Flight Center  
Greenbelt, Maryland 20771

Type I Progress Report  
ERTS-1

a. Title: Evaluate ERTS imagery for mapping and detection of changes of snowcover on land and on glaciers.

ERTS-A Proposal No.: 342-7

b. GSFC ID No. of P.I.: IN 045

c. Statement and explanation of any problems that are impeding the progress of the investigation:

Data delivery is now excellent, although the wintertime images are not as important as spring or summer data. Long delays in data requests inhibit progress.

d. Discussion of the accomplishments during the reporting period and those planned for the next reporting period:

Snowlines were drawn for South Cascade Glacier basin (3x5 km) for three cycles using greatly enlarged ERTS images. This basin was chosen because a large amount of ground truth and aircraft data exist. It was shown that useful snowlines can be derived from ERTS data even in a basin as small as this. It was also a helpful exercise to relate ERTS resolution to ground truth, especially in areas of partial snowcover with patches smaller than those resolvable from ERTS imagery.

Robert M. Krimmel spent three days at Stanford Research Institute working with William Evans on ESIAC. The purpose of this visit was to give another member of our staff direct experience with the ESIAC, to attempt several new experiments, and to clear up some questions between the investigators of Project 342-7 and Project 342-B.

The most promising experiment was to directly compare sequential frames of snowline data. This was tried using color transparencies of an oblique, ground-based time-lapse sequence. By playing a positive of one date against a negative of another date, areas that were first snow-covered and later free of snow are highlighted. The highlighted areas are easily masked, and the area measured. Since using the ground views, SRI personnel have also tried using ERTS images with some success.

The ESIAC was used to form a binary mask of the snowlines in the South Cascade Glacier basin as a direct comparison of results using optical methods versus electronic methods.

Frames of Mt. Rainier and Thunder Creek areas, previously analyzed by SRI, were recalled and Krimmel (an experienced glaciologist) formed video masks independently of SRI influence, confirming the techniques evolved by SRI.

Attention next period will be working with SRI toward refining the method of direct comparison of sequential images to derive snowcover area change data. We also expect to begin planning and coordination of anticipated U-2 overflights and associated ground truth.

e. Discussion of significant scientific results and their relationship to practical applications or operational problems including estimates of the cost benefits of any significant results.

A possibly more accurate method to determine snowcover area change has been tried; snowcover area change over periods of an ERTS cycle are very useful in determining energy balances over regional areas and to determine snow depth as a function of altitude. Also, since shadow and cloud cover areas are highlighted this method may be a step toward more complete machine processing.

f. A listing of published articles, and/or papers, pre-prints, in-house reports, abstracts of talks, that were released during the reporting period:

Paper "Evaluation of ERTS imagery for mapping and detection of changes of snowcover on land and on glaciers," was read at ERTS-1 Symposium, Greenbelt, Maryland, March 5-8.

Papers "New ways to monitor the mass and areal extent of snowcover" and "Applications of ERTS imagery to snow and glacier hydrology" were invited for Symposium on Approaches to Earth Survey Problems through the Use of Space Techniques, COSPAR, Konstanz, Germany; abstracts have been submitted.

g. Recommendation concerning practical changes in operations, additional investigative effort, correlation of effort and/or results as related to a maximum utilization of the ERTS system:

Urgently need additional U-2 overflights and ERTS imagery during summer of 1973 in order to have useful time sequence through a complete melt season.

h. A listing by date of any changes in Standing Order Forms:

7 November 1972.

i. ERTS Image Descriptor forms:

In preparation.

j. Listing by date of any changed Data Request forms submitted to Goddard Space Flight Center/NDPF during the reporting period:

All requests originated by User Services, GSFC.

k. Status of Data Collection Platforms:

N/A

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